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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,081	11/20/2003	Shih-Chieh Kao	10585-US-PA	1080

31561 7590 04/27/2006

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE  
7 FLOOR-1, NO. 100  
ROOSEVELT ROAD, SECTION 2  
TAIPEI, 100  
TAIWAN

EXAMINER
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KORNAKOV, MICHAIL

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/707,081

Applicant(s)

KAO ET AL.

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. Applicants amendment dated 02/16/2006 has overcome rejections over U.S. 2003/0116534 and U.S. 2002/0045332 and the rejections are withdrawn.
2. Claim 1 is amended to specify "removing a portion of the dielectric layer" and cleaning the opening "in the dielectric layer". Claims 1-7 are pending and examined on the merits.
3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1, 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Lin et al (U.S. 5,989,997).

Lin teaches a method for forming dual damascene structure, which includes cleaning an opening in the dielectric layer using a mixture containing sulfuric acid and hydrogen peroxide in water. The method of Lin comprises providing a substrate having a metallic layer and a dielectric layer formed thereon, wherein the dielectric layer is formed over the metallic layer; patterning the dielectric layer, thus removing its portion, to form a vertical window (reads on "opening", as instantly claimed) and exposing a portion of the metallic layer (col.4, lines 1-30); cleaning vertical window in the dielectric layer using a solution containing sulfuric acid and hydrogen peroxide (col.5, lines 23-26).

Therefore, all the limitations of the instant claims are met by Lin.

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5. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (U.S. 5,989,997).

Lin does not specifically indicate temperature of sulfuric acid/ hydrogen peroxide containing solution, concentrations of sulfuric acid and hydrogen peroxide and a duration of cleaning process. However, such parameters are result effective, since they affect the output and effectiveness of the cleaning process. Therefore, one skilled in the art would have found obvious to optimize the cleaning parameters in order to provide effective cleaning of vertical window in the process of Lin. Besides, concentrations and temperatures recited in claims 2-4 are conventionally utilized in the art, which is indicated in U.S. 2003/0116534 and therefore one skilled in the art would have found obvious to utilize such conventional parameters in the teaching of Lin with the reasonable expectation of success.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (U.S. 5,989,997) in view of Chooi et al (U.S. 6,566,260).

Lin does not specifically indicate that metallic layer is a composite layer as per claim 7. However, such composite layers are typically utilized in the art for the fabrication of dual damascene structures. Thus, Chooi teaches that interconnect in dual damascene structure is typically a composite stack comprising one or more of titanium nitride and aluminum-copper (col.7, lines 50-57). Therefore, one skilled in the art would have found obvious to utilize the typical composite stack including titanium nitride and aluminum copper in the teaching of Lin with the reasonable expectation of success.

***Conclusion***

7. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.
8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "M. Kornakov", with a long, sweeping horizontal stroke extending to the right.

Michael Kornakov  
Primary Examiner  
Art Unit 1746

04/25/2006